

Towards the Expansion of Japanese Apples Supply for Cut Fruit

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1. Introduction

In recent years, the purchase of edible agricultural products as fresh produce has been declining, and demand for processed food is rising (Yakushiji and Yoshida, 2012). In this study, we focus on cut fruits which have relatively new demand among processed fruit products, summarize the current situation relating to sales of retailers, and find out the characteristics of consumers of fruits and cut fruit. Additionally, we examined the issues for expanding Japanese apples supply for cut fruit.

2. Status quo of cut fruit sales among retailers

According to the survey for retailers such as mass merchandisers, department stores, and convenience stores (CVS), the volume of cut fruit handled in FY 2014 has expanded compared to just 5 years ago, and consumption of that cut fruit is growing (Table 1). Although the percentage of imported fruits as cut fruit ingredients is high, retailers and cut fruit manufacturers have intent to use domestically produced fruit for cut fruits from the standpoint of safety, security and product differentiation. On the other hand, as issues for domestic fruit use, there is the difficulty of ensuring stable trading price and trading volume, high prices, and the fact that fruit of adequate quality for cut fruit is not being provided, so it is necessary to resolve these issues.

3. Relationship between consumer attributes and "food consciousness" in fruit and cut fruit consumption

To examine the impact of consumer's "food consciousness" on their fruit and cut fruit consumption behavior, we used structural equation modeling (SEM) to conduct an analysis of our questionnaire survey ⁽¹⁾. As a result, senior citizens and women are consuming more fruit because they have more "health-conscious", and less "sense of burden for cooking". As for cut fruits, younger people buy more often because they are more "cost-conscious" and older people buy more often because they are more "health-conscious".

4. Issues for expansion of Japanese apples for cut fruit supply

(1) Current state of apples for cut fruit

We focused on quality, price and procurement routes of apples for cut fruit.

First, we introduce quality of apples. Various quality of apples are cultivated in one orchard, and apples for eating raw can be used for unpeeled standard cut fruit, but in the case of the peeled standard, they can be used even if there is a problem on the surface such as scratches and bruises. However, unlike apples for juice, apples that have internal damage such as insect or bird damage cannot be used. We find that middle quality of apples between the apples for raw consumption and apples for juice can be used for cut fruit.

Next we will discuss the price. Table 2 compares the apple procurement price of manufacturers and gross revenue of producers. With the exception of Company G, they are procured at a much lower price than those for raw consumption ⁽²⁾. The average price for 1 kg of apples for juice by year was ¥15 in 2009, ¥22 in 2010, ¥41 in 2011, and ¥29 in 2012 (Aomori Prefecture, 2014). This means apples for cut fruit are being traded at prices cheaper than those for raw consumption and more expensive than those for juice.

Many of these ingredient apples are procured from assemblers such as agricultural cooperatives which can ensure the quality and quantity that stabilize the necessary standards.

Table 1. Index of cut fruit volume in 2014 (2009=100)

Co. A (Mass retailers)	Co. B (Mass retailers)	Co. C (Mass retailers)	Co. D (Mass retailers)	Co. E (Department stores)	Co. F (Fruit shops)	Co. G (Convenience stores)
95	200	100	More than 200	150	500	300

Source: Interview surveys.

Note: As the convenience store Co. G did not handle cut fruit 5 years prior, this is a comparison with 3 years prior.

Note (1) Questionnaire surveys were conducted by the NARO (National Agriculture and Food Research Organization) Agricultural Research Center.

(2) In Table 2, the reason procurement prices for raw ingredient apples varies by manufacturer is that procurement methods and standard of fruit differ among each companies, including manufacturers that trade directly with the farmers, manufacturers that sort the apples that have already been sorted by agricultural cooperatives, and manufacturers that procure apples for raw consumption which were sorted by agricultural cooperatives.

Table 2. Gross revenue per 1 kg of apples and various company's apple procurement price

Gross revenue per 1 kg of apples					Desireble price as the lowest price	
2008	2009	2010	2011	2012		
155.61	157.02	171.44	205.07	180.29	200	
Various company's raw ingredient apple procurement price (ex-factory price)						
Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G
110-150	Maximum 250 Cultivar "Fuji" 120-150	Unknown	75-100	100	35-50	250-280

Source: Interview surveys and "Management Statistics by Farming Type" by the Ministry of Agriculture, Forestry, and Fisheries.

Note: "Gross revenue per 1 kg of apples" is the value found from dividing the apple revenue of apple crop management (average value) by the apple production volume (average) found in the "Management Statistics by Farming Type" by the Ministry of Agriculture, Forestry, and Fisheries. The "Desirable level as the lowest price" is the price disclosed as the level at which it goes below cost by the Nagano Fruit Tree Experiment Station and the NARO Tohoku Agricultural Research Center. Both research institutions disclosed the same price.

(2) Advantages and challenges in orchard cultivation of apples for cut fruit only

Regarding orchard cultivation of apples for cut fruit only, several manufacturers considers cultivation by contracts with farmers, and consider in-house cultivation. One company is already using part of the land held by its management as orchards for cut apples only.

Merits of orchard cultivation for cut fruit only include makers being able to select fruit suitable for processing, and the realization of fixed, inexpensive ingredient prices. However, the following issues can arise when performing contract cultivation for processing with farmers.

First, it is difficult to make compromises on the price. Intense fluctuations in the market and diverse quality of apples harvested give incentive for farmers to sell apples to other sales channels, and gives manufacturers incentive to pressure them into lower prices, so it may be difficult to connect this to fixed contract trading. In order to solve these issues, it will be necessary to establish a cultivation system based on what costs will be incurred on labor saving cultivation for cut fruit, and what price long term deals can be achieved at.

Second, in order to supply harvested apples to manufacturers year-round, it will be necessary to invest in storage facilities.

Third, in order to select and sell apples that cannot be used for cut fruit, it will be necessary to invest facilities and buyers.

Among the three issues we described compromising transaction price will be solved, if the manufacturer manages the apple orchard specialised for cut fruit, because manufacturer can take overall benefit of the processing and production division into consideration for apple procurement.

(3) Current state and issues of the cut apple manufacturing business

Demand for cut apples is growing. For example, a major retailer intends to handle cut apples at their affiliated CVS. However, supply has not kept up with demand. Issues faced by manufactures include management of hygiene, running up transportation costs of cut apple-only business, inability to ship other goods together, and development of machines for large-scale manufacturing. On these points, there are examples, such as regional companies collaborating with specialized trading companies to acquire sales and hygiene know-how, and prepared food manufacturers that already have sales and hygiene knowledge and are able to transport other goods.

5. Conclusion

This study has organized a variety of topics concerning cut fruit that have gained attention in recent years, including demand trends and the characteristics of consumer behavior toward cut fruit, the quality and prices of apples used as ingredients, and issues facing contract cultivation of apples for processing. In the future, more detailed examination will be necessary to find out what improvements of the current distribution system will be useful for apple procurement channel for cut fruit, and whether the amount of cut fruit standard apples can be increased.

References

- Aomori Prefecture (2014) "Guidelines for apple distribution policies for the crop of 2013".
- Yakushiji, Tetsuro and Yoshida, Yukisato (2012) "Outsourcing of food and changes in the buying arrangement of edible agricultural products: Study and application of classification methods of the food industry using input-output tables", *Journal of Food System Research* 19 (3), pp. 341-346.